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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,704	05/10/2007	Fumihiko Kimura	062916	4387
38834	7590	12/09/2008		
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP			EXAMINER	
1250 CONNECTICUT AVENUE, NW			ORTIZ RODRIGUEZ, CARLOS R	
SUITE 700			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20036			2123	
			MAIL DATE	DELIVERY MODE
			12/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,704	KIMURA ET AL.	
	Examiner	Art Unit	
	CARLOS ORTIZ RODRIGUEZ	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 10 September 2008.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-34 is/are pending in the application.
 - 4a) Of the above claim(s) 11-34 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-10 is/are rejected.
- 7) Claim(s) 1-10 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 25 August 2006 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) <input type="checkbox"/> Other: _____ .

DETAILED ACTION

1. Claims 1-34 are pending.
2. Claims 11-34 have been withdrawn from consideration.

Response to Arguments

3. Applicant's arguments filed 05/07/08 have been fully considered but are moot in view of the new ground(s) of rejection.

Please note that Claims 11-34 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 09/10/08. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Also, please note that this action contains new rejections under 35 USC 101 and 35 USC 122, 2nd paragraph. Accordingly this rejection is made Non-Final.

Drawings

4. The drawings are objected to because Figures 8 and 50 (specifically the text in the block labeled as UNKNOWN) contains the term "THEE-DIMENSIONAL" this term

should be “THREE-DIMENSIONAL”. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The abstract of the disclosure is objected to because it is not limited to a single paragraph. Correction is required.

Claim Objections

6. (Claims 1-7 Lines 1-2) objected to because of the following informalities: The term "characterized in that" would be better if written as "comprising the steps of" in order to clearly introduce the steps performed by the claimed method. Please note that this suggestion would also require the body of the claims to be modified to clearly list the steps performed by the claimed method. Appropriate correction is required.
7. Claims 2-8 recite the limitation "The design method for industrial products" in the preamble. It seems like the preamble of Claims 2-8 should read as: "The method for designing industrial products". In order to be consistent with the preamble of Independent Claim 1. Appropriate correction is required.
8. (Claim 1 Lines 5-6) objected to because of the following informalities: The term "three dimensional" would be better if written as "three-dimensional" (hyphenated) in order to maintain consistency throughout the claims.
9. (Claim 1 Lines 6-7, Claim 9 Line 8 and Claim 10 Line 5) objected to because of the following informalities: The term "a quadratic expression of a curve length or a curve length variable" would be better if written as "a quadratic expression consisting of a curve length or a curve length variable" in order to clarify the language by indicating that the curve length or a curve length variable are part of the quadratic expression.

10. (Claim 2 Line 3) objected to because of the following informalities: The term “industrial product” should be in plural form to be consistent with the amendment done in Line 3 of Claim 1.

11. (Claim 4 Line 2) objected to because of the following informalities: The term “contain” should be in plural form.

12. (Claim 5 Line 2) objected to because of the following informalities: The term “three-dimensional coordinate” would be better if written as “three-dimensional coordinate system”.

Claim Rejections - 35 USC § 112

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 1-8 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-7 appear to be method claims, however Claims 1-7 do not provide at least one step corresponding to the claimed method. The preamble of the claims provide for a method for designing industrial products, however the body of the claims do not clearly indicate which are the steps necessary in order to design industrial products.

The body of Claim 1 describes a shape of said industrial products and describes characteristics relevant to a three-dimensional clothoid curve, but does not actually indicate what are the steps necessary for designing industrial products.

The body of Claim 2, further describes the industrial product and a trajectory of motion of a mechanical element, but does not actually indicate what are the steps necessary for designing industrial products.

The body of Claim 3, further describes the industrial product and a regression path of a screw device, but does not actually indicate what are the steps necessary for designing industrial products.

The body of Claim 4, further describes the clothoid curve, but does not actually indicate what are the steps necessary for designing industrial products.

The body of Claim 5, describes spatial points, but does not actually indicate what are the steps necessary for designing industrial products.

The body of Claim 6 and Claim 7, further describes the clothoid curve, but does not actually indicate what are the steps necessary for designing industrial products.

Claim 8 depends on Claim 1 and is rejected for the same reasons of Claim 1 as indicated above.

At most, Claims 1-7 appear to be reciting: “using a clothoid curve”; without any active positive steps delimiting how this use is actually practiced.

Claim Rejections - 35 USC § 101

15. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

16. Claims 1-7 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-7 do not comply with 35 U.S.C. 101 because they are not tied to another statutory class (such as a particular apparatus) or transform underlying subject matter (such as an article or materials) to a different state or thing. The body of the claim must positively recite the particular apparatus performing the method steps. Although, Claims 1-7 appear not to have any recited steps, for purposes of examination it is being assumed that Applicants intend to claim at least one step of designing, if this is the case, then the body of the claim should positively recite, for example, using a computer to design a shape of industrial products.

17. Claim 8 rejected under 35 USC 101 because the claim embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only. Note that the preamble Claim 8 provides for a product however Claim 8 does not recite any structural elements and it depends on method claim.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haupt U.S. Patent 6,832,128 (hereinafter Haupt) in view Guiqing et al., “3D Discrete Clothoid Splines”, 2001 IEEE (hereinafter Guiqing) in view of Drennen et al. U.S. Publication No. 2002/0189385 (hereinafter Drennen).

a. Please note that since the language of the Claims 1-10 is not clear as indicated in the above rejection under 35 USC 112, 2nd paragraph, Claims 1-10 are being interpreted as best understood. For example, although the preamble of the claims provide for a method, no steps are provided in the body of the claim. Therefore, the prior art as applied in the following rejections are presented to show certain features of the present claims. However, a better explanation and reasoning of how the applied art teaches the invention will be possible when the claims are modified to clearly describe applicant's invention.

b. **Regarding claims 1 and 8-10,** Haupt discloses designing industrial products (Abstract and C4 L1-35, please note that since the claim language is not limited to a specific industrial product the term industrial product is being considered as a workpiece). Haupt further discloses shapes of industrial products designed by using a three-dimensional curve (C4 L1-35, please note designing the workpiece using three-dimensional splines).

But Haupt fails to clearly specify a clothoid curve.

However, Guiqing discloses a clothoid curve (see for example Abstract and Introduction)

Haupt and Guiqing are analogous art because they are from the same field of endeavor. They both relate to three-dimensional curves used for surface modeling.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings disclosed by Haupt and combining them with the teachings disclosed by Guiqing.

One of ordinary skill in the art would have been motivated to do this modification in order to produce fair and pleasing 3d curves as suggested by Guiqing (see for example Page 324 Column 1 Lines 12-13).

The combination of Haupt and Guiqing fails to clearly specify wherein each of a pitch angle and a yaw angle in a tangential direction of said three-dimensional clothoid curve is given by a quadratic expression of a curve length or a curve length variable.

However, Drennen discloses a cylindrical screw shaft, a cylindrical ball nut surrounding the cylindrical screw shaft and a plurality of bearing balls rotatably interposed a first spiral groove in an outside peripheral surface of the cylindrical screw shaft and a second spiral groove in an inside surface of the cylindrical ball nut. The spiral grooves are aligned and spaced apart such that the bearing balls are free to rotate as the cylindrical ball nut is rotated about the cylindrical screw shaft. The bearing

balls allow relative rotation between the cylindrical screw shaft and the cylindrical ball nut just as in a conventional ball screw. As the cylindrical ball nut rotates relative to the cylindrical screw shaft, the cylindrical ball nut will move in a linear direction along the cylindrical screw shaft just as in a conventional ball nut (see for example the Abstract and Paragraphs 0002, 0007 and 0033).

Haupt, Guiqing and Drennen are analogous art because they are from the same field of endeavor. They all relate to systems for designing/manufacturing products with three-dimensional curvature surfaces and products with three-dimensional curvature surfaces.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings disclosed by combination of Haupt and Guiqing and combining them with the teachings disclosed by Drennen.

One of ordinary skill in the art would have been motivated to do this modification in order to optimize surface quality as suggested by Haupt (see for example, C3 L66-67). *Note that the ball screw apparatus disclosed by Drennen could be designed using a three-dimensional spline like the one disclosed by Haupt and more specifically using a three-dimensional clothoid spline like the one disclosed by Guiqing. If a three-dimensional clothoid curve is used to design the ball screw apparatus disclosed by Drennen it would have a pitch angle and a yaw angle in a tangential direction of the three-dimensional clothoid curve and*

would be based on a curve length or a curve length variable due to the intrinsic characteristics of the ball screw apparatus disclosed by Drennen.

c. **Regarding claim 2**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Drennen further discloses an industrial product including a mechanism in which a mechanical element having a mass moves (see for example the Abstract and Paragraphs 0002, 0007 and 0033). Haupt further discloses that a trajectory of motion of a mechanical element is designed by using the three-dimensional curve (see for example C12 L1-57).

d. **Regarding claim 3**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Drennen further discloses a screw device including a mechanism in which a ball as the mechanical element moves, the screw device comprises a screw shaft having an outer surface on which a spiral rolling element rolling groove is formed, a nut having an inner surface on which a load rolling element rolling groove is formed so as to be opposed to the rolling element rolling groove and a regression path is formed to connect a one end and the other end of the load rolling element rolling groove, and a plurality of rolling elements disposed between the rolling element rolling groove of the screw shaft and the load rolling element rolling groove of the nut and disposed in the regression path (see for example the Abstract and

Paragraphs 0002, 0007 and 0033. Haupt further discloses a path designed by using a three-dimensional curve (see for example C12 L1-57).

e. **Regarding claim 4**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Please note that the equation expressions, parameters and variables present in this claim are characteristics of the three-dimensional clothoid curve and are obtainable by performing mathematical manipulations known in this art.

f. **Regarding claim 5**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Haupt further discloses that a plurality of spatial points are specified in a three-dimensional coordinate and these spatial points are interpolated by using a three-dimensional curve (see for example Column 15 and more specifically Lines 44-47).

g. **Regarding claim 6**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Guiqing further discloses that, between a one three-dimensional clothoid segment and the next three-dimensional clothoid segment, positions, tangential directions, normal directions, and curvatures of both the one and next three-dimensional clothoid segments are made continuous to each other, respectively, at the plurality of spatial points (see for example Section 3.2 and Section 4).

h. **Regarding claim 7**, the combination of Haupt, Guiqing and Drennen discloses all the limitations of the base claims as outlined above. Please note that the equation expressions, parameters and variables present in this claim are characteristics of the three-dimensional clothoid curve and are obtainable by performing mathematical manipulations known in this art.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Ortiz-Rodriguez whose telephone number is 571-272-3766. The examiner can normally be reached on Mon-Fri 10:00 am- 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Carlos Ortiz-Rodriguez
Patent Examiner
Art Unit 2123

December 10, 2008

/Paul L Rodriguez/
Supervisory Patent Examiner, Art Unit 2123